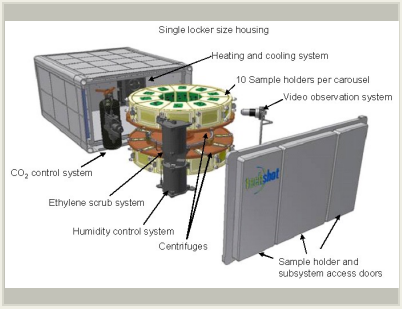
Small Business Innovation Research/Small Business Tech Transfer

Multi-Specimen Variable-G Facility for Life and Microgravity Sciences Research, Phase II

Completed Technology Project (2012 - 2014)

Project Introduction

The Multi-specimen Variable-G Facility (MVF) is a single locker sized centrifuge facility for life and microgravity sciences research on the International Space Station. The MVF is a rear breather EXPRESS Rack payload that leverages many of the existing subsystems of flight proven (STS-108) Avian Development Facility (ADF) thereby reducing costs and time to flight for new scientific capability. Two centrifuge rotor platforms are capable of applying 0–2 g's to the modular specimen containers which can be modified to accommodate a wide variety of experiment samples. Curved cell culture specimen containers are designed to maintain a constant radius (within ? 1 mm) without inertial-gradient shearing or significant Coriolis acceleration. Each rotor can accommodate 10 generic modular experiment specimen holders which can be accessed in real-time on-orbit any time during an experiment. The centrifuge platforms include an active balancing system to ensure balanced rotation when the experiment sample modules contain slightly variable mass. The MVF will control g-levels, temperature, humidity, ethylene, CO2 and other gases, and provides video observation capability with its removable modular subsystem allowing on-orbit cleaning and/or replacement. The potential uses of the MVF are numerous, such as cell culture, aquatics, plants, algae, and invertebrate organisms. The modular multi-specimen holder can be utilized as a prokaryotic and eukaryotic cell culture vessel. It can be used to contain aquatic organisms such as Zebra fish, Medaka, tadpoles, and even developing amphibian eggs. Seedlings, small adult plants (Arabadopsis), and even fern spores could be located within the specimen holder. Other possibilities include Algae (Chara) and fungi (S. cerevisiae). During the Phase II project, Techshot will complete the MVF design, fabricate a flight-like prototype, and test the hardware by performing selected biological experiments to demonstrate its scientific utility.



Multi-Specimen Variable-G Facility for Life and Microgravity Sciences Research Project Image

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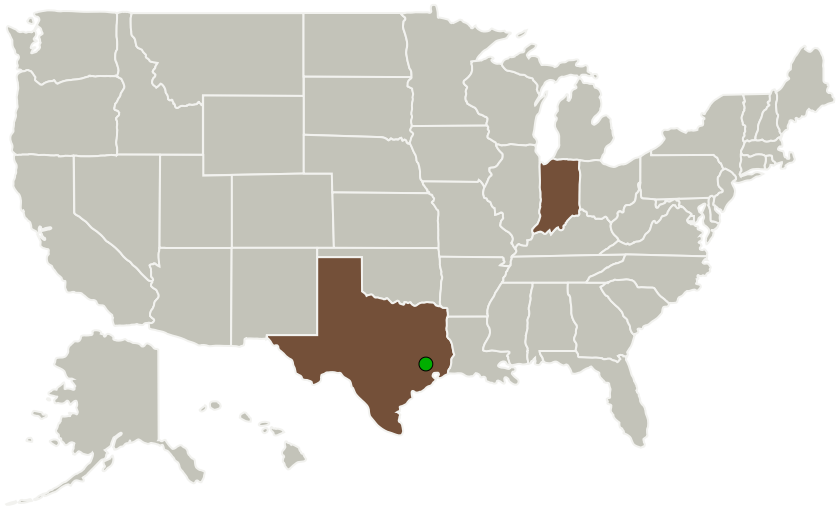
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Techshot, Inc.	Lead Organization	Industry	Greenville, Indiana
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Indiana	Texas

Project Transitions

July 2012: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137307)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Techshot, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

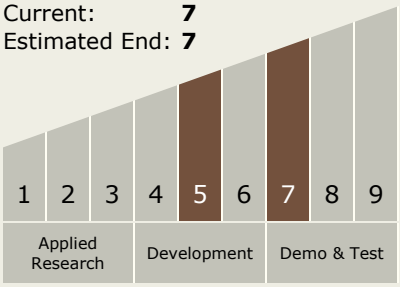
Carlos Torrez

Principal Investigator:

John C Vellinger

Technology Maturity (TRL)

Start: **5**
Current: **7**
Estimated End: **7**



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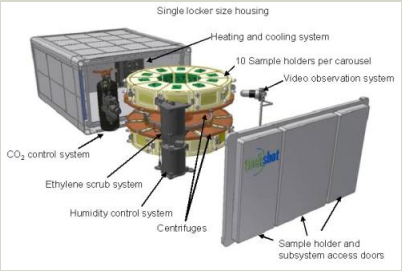
Images



Project Image
Multi-Specimen Variable-G Facility for Life and Microgravity Sciences Research Project Image
(https://techport.nasa.gov/image/128123)

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.3 Human Health and Performance
    - TX06.3.1 Medical Diagnosis and Prognosis

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System